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turkey, magpie and pheasant; and while in the light of the present knowledge of our native birds, we may be reasonably sure of the species to which he refers, this passing reference is of no value other than one of historical interest.

In 1819-20 the memorable expedition of Major Long was made, and with this party came the first trained ornithologist who entered the boundaries of our state as it exists today. Thomas Say on this trip recorded twenty-one species, eight of which were new to science, and were described in the account of the expedition published in Philadelphia in 1823.

Beginning with the famous Fremont expeditions in 1843-45, the War Department sent into the western country six exploring parties that entered Colorado, and most of these parties contributed more or less to the then meager stock of knowledge regarding our bird life. It is rather interesting to note the routes followed by the various parties, as it gives a very clear idea of the vast scope of country which was not touched by any of these parties.

(1) Lieut. Pike in 1806-7 followed up the course of the Arkansas River to about where Canyon City now stands, thence in a roundabout way thru South Park, San Luis Valley and south into New Mexico.

(2) Major Long in 1820 followed up the South Platte River to Denver, crossed the "Divide" to Colorado Springs, and then went south into New Mexico, while a detachment of his party went down the Arkansas River to Kansas.

(3) Capt. Fremont, coming West in 1843, came from Kansas and crossed to the South Platte, up this to Denver, and over the "Divide" to Colorado Springs and Pueblo, back again over the same route to Denver, north to the Poudre, up the Poudre to North Park, and north to Wyoming. Eastward in 1844 he came into Colorado from Utah, by way of the valley of the Grand River, and spent much of the summer in exploring North, Middle and South Parks; crossed from the latter to the Arkansas, down this to Bent's Fort, and then northeast across the prairie to Kansas.

(4) Capt. Fremont in 1845 came across Kansas westward to Bent's Fort on the Arkansas River, up this river to its source, across into Middle Park, then west to White River, down this to Utah. A detachment from this party under command of Lieut. Abert, went south from Bent's Fort to the headwaters of the Canadian River in New Mexico.

(5) Capt. Pope in 1851 came northwest from New Mexico to La Junta, thence down the Arkansas River into Kansas.

(6) Capt. Gunnison in 1853 followed up the Arkansas River and its tributaries to Trinidad, thence west of old Fort Massachusetts, near the present site of Fort Garland, north over the Continental Divide onto the Gunnison River, thence down that stream and the Grand River into Utah.

(7) In 1855 Lieut. Warren just touched at Julesburg in passing across western Nebraska.

(8) Lieut. Bryan in 1856 followed up the South Platte River to Fort Morgan and then turned north into Wyoming. On the return trip the party entered Colorado from Wyoming near the headwaters of the Cache á la Poudre River, and followed down this stream to its junction with the Platte, and down this latter stream to Nebraska. A detachment explored the district in Colorado north of the Poudre River and east to Crow Creek.

(9) In 1859 Col. Loring and Capt. Macomb passed across the southwest corner of the State in passing from Utah into New Mexico.

The specimens and field notes of the naturalists attached to these various expeditions were worked up under the supervision of Prof. Spencer F. Baird, who was

then Assistant Secretary of the Smithsonian Institute, and incorporated into the ninth volume of the Pacific Railroad Reports. Some additional notes were included in Volume X.

The total number of species recorded for the first time from Colorado in the Pacific Railroad Reports was twenty-three, and these, together with the eleven species recorded by Say, or thirty-four species in all, constituted the entire checklist of Colorado, with the exception of one species added by Baird in 1870, at the time Dr. J. A. Allen visited the State in 1872, and to his untiring efforts while within our State we owe the first important step in the development of our ornithological knowledge. The results of his observations, which were published in 1872 as a Bulletin of the Museum of Comparative Zoology under the caption of "Notes of an Ornithological Reconnaissance of portions of Kansas, Colorado, Wyoming and Utah," contained the first local list ever published of Colorado birds and added eighty-four species not before recorded for Colorado.

Shortly after, and during the same year that Dr. Allen's paper appeared, the vast amount of material and information which had been collected by Mr. C. E. Aiken during several years previous to 1872 were published as Proceedings of the Boston Society of Natural History under the title of "Notes on the Birds of Wyoming and Colorado Territories," by C. H. Holden, Jr., with additional memoranda by C. E. Aiken. This paper was edited by Prof. T. M. Brewer, with the statement that Mr. Holden's notes were taken in northern Colorado and southern Wyoming, but as no precise localities are given in Mr. Holden's notes they are not available as actual Colorado records. Mr. Aiken's notes, however, treat of 142 species, 59 of which are new records for Colorado. It is unfortunate that Mr. Aiken's notes were not published previous to those of Dr. Allen, as many of the species recorded for the first time by Allen were observed by Aiken before they were by Allen, thus depriving Aiken of the honor of their discovery, which, through his unflinching efforts in the interest of ornithology, he so richly deserved. Mr. Aiken's observations constitute the greatest amount of information gathered by any one man on this subject, and the paper just mentioned contains the first account of the winter movement of our birds.

In 1873 Mr. Robert Ridgway published in the Bulletin of the Essex Institute the first list of Colorado birds. This list contains 243 species, of which 59 are recorded for the first time from Colorado. It is purely a compilation, based upon the field notes of various naturalists; the greater part of the list is based upon the notes of Mr. Aiken, while many of the species were included on the authority of Henshaw, whose work did not appear until two years later, and a few species were included upon the strength of their occurrence in the Maxwell Collection, although a complete list of the birds in this famous collection was not published until 1877.

In 1874 Dr. (then Capt.) Elliott Coues published (as a United States Geological Survey bulletin) "Birds of the Northwest," which plays an important part in our subject, as it contains the only published account of the material collected by Stevenson on the trip made by Dr. Hayden's party in 1869. This party started from Cheyenne, worked south as far as Denver, thence west across the range into Middle Park, and back to Denver and south along the edge of the foothills into New Mexico. "Birds of the Northwest" also contains the very complete notes of Mr. T. M. Trippe on the birds of Idaho Springs and vicinity.

In 1873 Mr. H. W. Henshaw made prolonged visits at Denver and San Luis Valley, and in 1874 Mr. Aiken as his assistant made large collections in the vicinity of Colorado Springs, and Pueblo, and from there through the San Luis Valley as far west as Pagosa Springs. The results of these investigations were published in

1875 as United States Geological Survey reports. This work contains specific Colorado records of 170 species of which 14 are recorded for the first time.

In 1877 Robert Ridgway published the first complete list of the birds in the Maxwell collection at Boulder. This wonderful collection gathered and prepared by Mrs. Maxwell contained 234 species of birds, 21 of which were recorded for the first time for Colorado in Mr. Ridgway's list.

In 1878 Coues' "Birds of the Colorado Valley" appeared, but it does not play an important part in our subject as most of the ornithological information contained in it is copied from the Henshaw report of 1875.

Now, in looking back over the work done by these pioneer naturalists, we recognize a steady and comparatively rapid development, which had its beginning in 1823. In this short space of fifty-four years the basis of our present knowledge of Colorado ornithology was firmly laid, and our pioneer ornithology really ends with 1877; for from that year up to date the 108 species which have been added to our list have been recorded separately or in very small numbers, with the exception of Cooke's "Birds of Colorado", published in 1897, which added nineteen new species to the check list. In fact during this period of twenty years no more than nine new species have been recorded for the State at any one time, this being a list by Horace G. Smith published in the *Nidologist* in 1896, which with five new species recorded by him in 1886 makes a total of fourteen species recorded for the first time by him.

Thus it will be seen at a glance that the basis of our present knowledge of this subject may be attributed to Thomas Say, Spencer F. Baird, J. A. Allen, C. E. Aiken, Robert Ridgway, H. W. Henshaw, Horace G. Smith and W. W. Cooke, a group of names of which not only Colorado but indeed North America at large may well be proud.

Up to this point our attention has been focused almost entirely upon the development of the subject thru the addition of new species to our check-list, and as a matter of fact, up to this time, these additions have been the matter of prime importance; but from now on, with the great bulk of native species known and recorded, the addition of new species assumes its proper place as simply an incidental phase of the subject; and the more intricate and important phase of ornithology, the life histories of the birds, takes its place. The stupendous task of working out the breeding range, seasonal movements, migration, food habits, economic value, and subspecific nomenclature had its beginning as far back as our first information on ornithology dates; but these first efforts were very unimportant as compared with the work which has been done since. Not until the time of Aiken and Allen in the early seventies was any systematic work done along these lines; and it is a notable fact that the observations of some of the pioneer naturalists are, even up to the present time, considered the standard works along these lines. Two notable instances of this fact are the field notes of C. E. Aiken and T. M. Trippe.

But with this new branch of the subject come many new names; and instead of a few authorities publishing a few pretentious and more or less comprehensive works, we find a larger number of authorities recording valuable additions to our information on the subject as magazine articles, or in similar ways. Thus from 1877 to 1897 a great deal of data was published by a number of naturalists, much of it being of a purely local nature; but from the fact that it was local it was doubly valuable, in that the sum total of this local work made possible the very comprehensive resume of the subject that was published by Cooke in 1897.

Before turning our attention to the local work two lists must be mentioned as among the important contributions to our state ornithology.

The first was a paper written by Mr. F. M. Drew "On the Vertical Range of Birds in Colorado", which was published in the *Auk* in 1885. This paper, which contained notes on 277 species of which four were new to the State, was by far the most important contribution to our knowledge of bird distribution up to that time, and even up to the present date it remains a standard reference work.

The other paper, entitled the "Birds of Colorado", was written by Mr. Chas. F. Morrison and published in the "Ornithologist and Oologist" in 1888-89-90. I can not do better than to quote Prof. Cooke. Speaking of this list he says, "It is the most extensive list of Colorado birds published up to this time. Begins with No. 1 of the A. O. U. Check-List and closes with No. 570 enumerating 233 species. The list was never completed, owing to the destruction by fire of much of the material. In addition to records of birds already published, the author had the use of a large amount of unpublished notes sent him by local collectors. The list if completed at that time would have shown 326 species, but as the records of some 14 species recorded here have since been ascertained to be incorrect it would reduce the real number to 312 or 35 more than Mr. Drew's list published three years previous."

In the earlier part of our discussion we noted the routes followed by the various exploring expeditions that touched this State and got a fair idea of the scope covered by their reports; but for obvious reasons their observations were of a transient nature, and as a rule contained very little regarding the local status of any given species. Let us now turn our attention to the men who, while not covering such a large scope of country, confined their efforts to some restricted area and worked out the ornithological problem to greater or less completeness.

As I have said before the first real local lists that were published were contained in J. A. Allen's paper published in 1872. This paper contained three lists of importance, one list of 81 species observed in Colorado during July and August, a list of 54 species observed in South Park, Park County, in July, and a list of 36 species observed during the same month on Mt. Lincoln, Park County.

The Henshaw report published in 1874 contains two local lists. One of these is a list of 82 species observed at Denver, and the other is a list of 104 species observed at Fort Garland, Costilla County.

In this same year the very complete notes of Mr. T. M. Trippe on the birds of Idaho Springs and vicinity (Gilpin and Clear Creek Counties) were published in "Birds of the Northwest", but as they are scattered thru the body of the book their segregation into a local list is difficult.

In 1879 W. E. D. Scott published a list of 60 species observed at Twin Lakes, Lake County, and this, so far as I know, is the only published record referring specifically to Lake County.

In 1881 Mr. F. M. Drew published the results of several years' active work in southwestern Colorado as "Field Notes on the Birds of San Juan County, Colorado." This list contains 104 species, including six species new to the State, and gives much valuable information regarding breeding habits, migration and occurrence.

In 1882 and 1884 Mr. D. D. Stone published two short lists of birds observed above 11,000 feet in the vicinity of Hancock, Gunnison County. The first list treats of 16 and the second of 18 species, and while these lists are very small they are of unusual interest owing to the altitude at which they were taken.

In 1883 Allen and Brewster published an annotated list of 134 species observed

in the vicinity of Colorado Springs, and, in connection with the extensive observations of C. E. Aiken at Fountain and other points, covers the bird life of El Paso County thoroly. The Aiken notes mentioned before, which were published in 1873, include 142 species observed in El Paso County.

In 1883 H. D. Minot published a list of 44 species observed in Boulder County (and at Manitou, El Paso County), and this list, together with the list of the Maxwell collection published by Ridgway, and the copious notes of Dennis Gale published in Bendire's "Life Histories", constitute the great bulk of published information regarding the birds of Boulder County.

In 1885 C. W. Beckham published a "List of the Birds of Pueblo County" containing 91 species, to which he added 22 additional species in a supplementary list published two years later. Beside the work of Beckham in Pueblo County W. D. Lowe did much work there, and among other things published a list of the dates of arrival of 70 species. Herman W. Nash, Capt. D. P. Ingraham and P. L. Jones also did valuable field work there, altho very little of the results of their observations was published until they appeared in Cooke's "Birds of Colorado."

In 1886 C. F. Morrison published a list of 31 species observed at Fort Lewis, La Plata County, and two years later he published a "List of the Birds of La Plata County" containing notes on 116 species, which probably included the notes used in the former paper.

In 1889-90 V. L. Kellogg published a list of the summer birds of Estes Park, Larimer County, containing 89 species, and this was followed in 1896 by a list of 76 species observed by Richard McGregor.

In 1894 W. D. Lowe published a list of the birds of the Wet Mountains, Huerfano County, containing 76 species, and giving much valuable information regarding their vertical distribution.

In 1896 Horace G. Smith published a list of 35 species mostly water birds, observed in the vicinity of Denver, nine of which are recorded from Colorado for the first time. Mr. Smith also published in 1893 a list of 32 species observed in the city of Denver.

This in substance was the status of published local knowledge up to the time that W. W. Cooke published his "Birds of Colorado" in 1897. I do not mean to imply that these authorities were by any means the only ones at work in the State, for a number of well known ornithologists were at work in different places, who up to this time had not published the results of their observations in a comprehensive manner. Breninger, W. G. Smith and Osborn in Larimer County, Dille in Weld County, Horace G. Smith at Denver, E. L. Berthoud at Golden, Capt. P. M. Thorne at Fort Lyon, Edwin Carter in Summit and Grand Counties, and several others in various parts of the State were doing systematic field work; but up to this time (that is 1896-7) their notes as a whole were not available to the public. It may be mentioned in this connection that a great deal of this information has not been published up to this time.

In 1897 Prof. W. W. Cooke published as a Bulletin of the State Agricultural College "The Birds of Colorado" which up to the present date is by far the most complete and comprehensive work on Colorado birds. This publication which contains fully annotated records of 363 species is a careful compilation of all the work done in the State and contains, beside this, the first and only complete bibliography of Colorado ornithology, as well as a very comprehensive outline of the history of the subject, to which I am indebted for much of the data contained in this paper.

In addition to the great amount of data mentioned heretofore, Prof. Cooke

with characteristic energy opened an extensive correspondence with ornithologists in all parts of the state with the result that the following additional notes were placed at his disposal and incorporated into his work.

A. W. Anthony: list of 226 species taken in Colorado.

W. H. Bergtold: notes on 20 species taken in Routt County and at Denver.

G. F. Breninger: list of 257 species taken in Larimer County.

R. A. Campbell: list of 40 species noted at Boulder.

E. B. Darnell: notes on 68 species observed in Routt County.

H. G. Hoskins: notes on 58 species seen near Burlington, Kit Carson County.

W. P. Lowe: list of 188 species found at Pueblo and in the Wet Mountains.

Chas. F. Morrison: list of 332 species known to occur in Colorado.

Wm. Osborn: annotated list of 254 species identified by himself and W. G. Smith in the vicinity of Loveland.

Capt. P. M. Thorne: annotated list of 160 species collected by himself at Ft. Lyon during a five year's residence.

In 1898 Prof. Cooke publisht a supplement to the list, containing eleven additional new species and much valuable information regarding habits, distribution, etc.

A second supplement publisht in 1900 contains a full account of the observations of Edwin Carter in Summit County and Middle Park covering 184 species, and also much valuable information based upon the more recent work of C. E. Aiken on the "Divide" between Colorado Springs and Denver. The second supplement adds 13 new species to the state list, making a grand total of 387 species recorded for Colorado up to May, 1900.

The bibliography of the two supplements contains 43 additional references to Colorado birds, and Prof. Cooke writes me under a recent date that 106 titles have been added to this since 1900, making a total (with the 182 references contained in the original list) of 331 titles in all up to the present time.

In this connection it might be well to mention the standard works on American ornithology, that contain specific references to Colorado birds. Thus in Baird, Brewer and Ridgway's "History of North American Birds" we find specific Colorado records for 54 species; in Bendire's "Life Histories of North American Birds" of 26 species; in Coues' "Key to North American Birds", 35 species; in Davie's "Nests and Eggs of North American Birds", 77 species; in Fisher's "Hawks and Owls of the United States", 12 species; in Maynard's "Eggs of North American Birds", 22 species; and in Ridgway's "Manual of North American Birds", 34 species. These numerous references however, have no bearing upon the historical phase of the subject, as they are nearly all based upon notes publisht previously, and mentioned before in this paper. In fact in this entire list of standard works less than half a dozen species are credited to Colorado for the first time, of which three species are given without any authority for the record. Their chief value lies in the wide publicity given these Colorado records owing to the widespread use of these books as reference works.

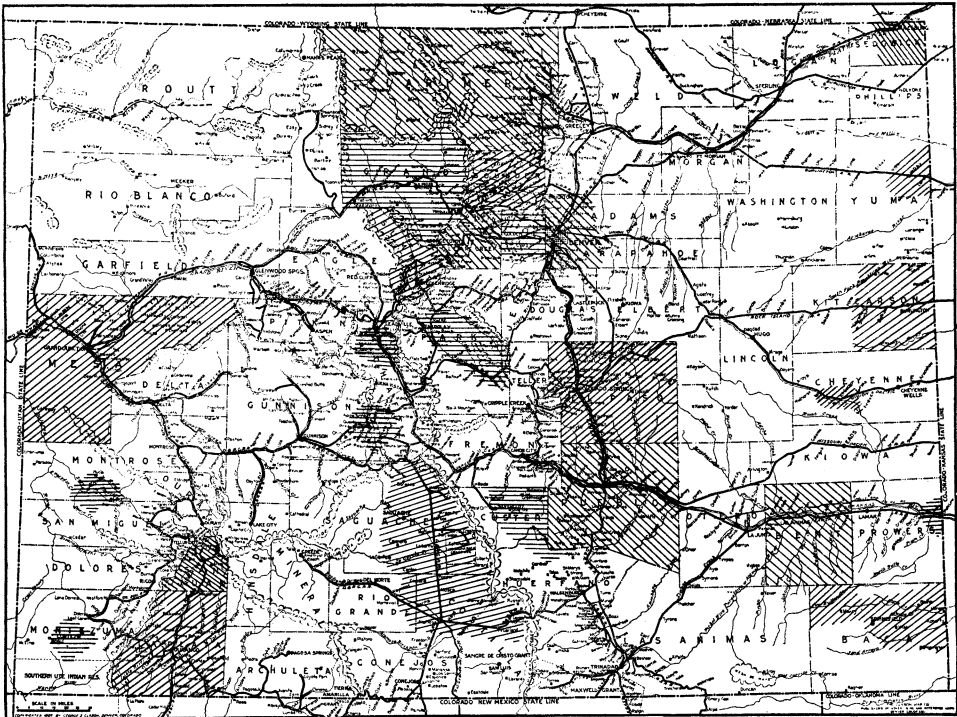
You are probably aware of the progress of ornithological work in the State during the past eight years. Most of the pioneer naturalists are gone, or are carrying on their observations in other states, and their places have been taken by a newer coterie of students among whom the members of this society are represented. Beside our own members the names of Horace G. Smith, Ferril and Felger at Denver, Henderson at Boulder and a few others are familiar to us all.

The work of Smith and Ferril for the State Historical Society is worthy of especial attention in this connection because it is in accord with a point which I



wish to make later on. These gentlemen are devoting much time to the study of the more remote parts of the state particularly the eastern boundary, where quite extensive observations have been made at Julesburg, Holly, Wray, and Kit Carson. In addition to this the southern boundary has been worked, principally at Water-vale, Trinidad, Las Animas, and Pagosa Springs. A resume of the more important discoveries made by the gentlemen was written by Smith and published in the *Auk* of April, 1908. This article adds four new species to the state list, and gives important additions to our knowledge of the distribution of 35 species of rare occurrence in Colorado.

Among our own members, the list of birds observed by Warren on his extended trip thru north central and northwest Colorado, enumerating 93 species;



MAP OF COLORADO SHOWING LOCALITIES (SHADED) IN WHICH ORNITHOLOGICAL INVESTIGATIONS OF MORE OR LESS IMPORTANCE HAVE BEEN CARRIED ON

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and his list of the birds of extreme southeastern Colorado containing 84 species; the list of birds of southwestern Colorado by M. French Gilman, containing 120 species; and the list of 154 birds of Mesa County by myself, constitute the local lists published during the past two years, all of which appeared in *THE CONDOR*.

In addition to the work done by local students in recent years Mr. Merritt Cary of the U. S. Biological Survey has spent the greater part of three seasons within the state working out life zones, and his notes on the bird life of the various sections visited when published will doubtless contain much of interest.

This outlines in general the more important work that has been done in Col-

orado up to the present time, and brings me to the point which I wish most to emphasize.

A glance at the map will show that by far the greater part of ornithological work in Colorado has been restricted to the central portion of the state: a strip running from the northern to the southern boundary and comprising less than a third of our total area. This leaves the boundaries of our state practically untouched on all four sides, with the exception of the work done by Smith and Ferri1, and that done by Warren in the southeast corner; and the surprising discoveries made by these gentlemen, is proof sufficient that it is in these remote parts of the state that our work from now on should be done and that from these places will come the most important additions to our information regarding Colorado ornithology.

No better illustration of this fact could be found than that mentioned by Cooke where he states that in the collection of Frank Bond at Cheyenne, Wyoming, are six species of birds, taken by him at Cheyenne, less than ten miles from the Colorado line that have not yet been recorded from this state.

The eastern base of the foothills and much of the mountainous central portion of the state, were quite thoroly worked years ago; yet I think that most of us must plead guilty of doing over and over the work that has been so well done by those who were here before us. I do not mean to imply that our time is wasted in studying sections that have been thoroly studied, for there is always a great deal to be learned no matter how carefully the ground has been gone over before; but I do maintain that our efforts would be conducive of a greater number of, and more important, discoveries if we turned our attention to those sections whose ornithology has been neglected.

Does this condition of affairs not furnish food for reflection and would it not be a wise move for the active ornithologists of the state to get together and formulate a definite line of work whereby the little studied portions of the state will receive the attention we are now bestowing upon that portion of the state whose ornithology is long past the elementary stage of development?

*Denver, Colorado.*

## FROM FIELD AND STUDY

**Microscopic Subspecies: a Reply.**—Mr. C. B. Linton (CONDOR, X, 181) raises again the question of the indentification of closely related subspecies taken from a boundary zone—neutral territory where the two intergrade. He also opens a question for answer that is practically the old question so often raised by the beginner in ornithology—"how are we going to name a bird correctly?" To this there is but one answer, I think, and I will endeavor to illustrate.

To begin with, Mr. Linton's caption "Microscopic" is hardly applicable as it stands; he does not state that the subspecific differences recognized between the *types* of the races mentioned are microscopic, but that the differences evident in the particular specimens he had in hand were microscopic; hence he is not warranted in applying the adjective to the race or its types, but should confine it to the specimens he refers to. That a recognizable difference exists between the types he has the authority of the A. O. U. Committee for. Take for instance the colors blue and green; they are certainly distinct when typical, but when we get to the greenish-blues and bluish-greens, there comes a point when no one can say positively what the color is. The same is true of subspecies; the types may be very different, but there comes a point when a specimen must be called intermediate—where one form grades into the other and it is impossible to state definitely to which race the specimen shall be referred.

It is also known that individuals of one race may be taken in the type locality of a closely related race. These individuals wander away from home. An Englishman may go to New York, yet he is still an Englishman!

This brings us to the answer to Mr. Linton's question: It is not always possible to definitely